

an optical material arranged at predetermined positions on an object comprising a display substrate, first bus lines, and second bus lines, the predetermined positions being defined by features of which repellency to the optical material in liquid or a liquid precursor of the optical material is substantially different from that of the peripheries of the features; and

the optical material being arranged by ink jet method,
there not being a starting material for forming the features at the predetermined positions.--

--61. A display device comprising:

an optical material arranged at predetermined positions defined by features on an object comprising a display substrate, scanning lines, and signal lines,
there not being a starting material for forming the features at the predetermined positions.--

--62. The method device comprising according to claim 61, further comprising switching elements.--

--63. The display device according to claim 62, the switching elements being thin film transistors.--

--64. The display device according to claim 50, the features being projections which surround the optical material.--

--65. The display device according to claim 64, the scanning lines and signal lines being formed below the projections.--

REMARKS

Claims 1-19, 32, 50, 51 and 53-65 are pending in this application. By this Preliminary Amendment, claims 1-14 and 50-51 are amended, and new claims 53-65 are added.

Moreover, claim 52 is cancelled without prejudice or disclaimer. Reconsideration in view of the amendments and following remarks is respectfully requested.

The attached Appendix includes marked-up copies of each rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

The Office Action mailed on May 9, 2001 indicates that the Information Disclosure Statement (IDS) filed on September 15, 2000 fails to comply with 37 CFR §1.98(a)(2). Applicants respectfully point out that JP 03/192,334 was already considered in Paper No. 5 as indicated in the signed form PTO-1449 dated May 4, 2001 that was returned to Applicants. Moreover, U.S. Patent No. 4,007,462 was cited in the September 20, 2000 Office Action.

The May 9 Office Action rejects claims 1-19, 47/2-47/19, 47/32, 48/2, 48/3, 48/5-48/10, 48/12-48/19, 49/7, 49/8, 49/11, 49/13 and 50-52 under 35 U.S.C. §102(b) as being anticipated by Yuichi (European Patent No. 6,281,917) or Masayuki (U.S. Patent No. 7,134,288); claims 1-19, 47/2-47/19, 47/32, 49/7, 49/8, 49/11, 49/13 and 50-52 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shiba (U.S. Patent No. 6,180,294); and claims 48/2, 48/3, 48/5-48/10 and 48/12-48/19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shiba in view of Kim (U.S. Patent No. 5,274,481) or Akins (U.S. Patent No. 5,399,390). Applicants respectfully traverse the rejections as applied to claims 1-19, 32, 50-51 and 53-65.

In particular, Applicants assert that Yuichi, Masayuki, Shiba, Kim or Akins, either alone or in combination, disclose or suggest a display device, having at least features of which repellency to optical material in a liquid or a liquid precursor of the optical material are substantially different from that of peripheries of the features, there not being a starting material for forming the features at the predetermined positions, as recited in independent claim 1, and similarly recited in independent claims 50, 60 and 61.

Furthermore, neither Yuichi, Masayuki, Shiba, Kim or Akins disclose or suggest a method of manufacturing a display device, having at least steps of forming features of which repellency to an optical material in a liquid or a liquid precursor of the optical material is substantially different from that of peripheries of the features on an object comprising a display of a substrate so that a difference in height between the features and predetermined positions defined by the features is formed, and applying the optical material or the liquid precursor to the surface where the features are formed by an ink jet method, as recited in independent claim 2, and similarly recited in independent claim 5.

Moreover, neither Yuichi, Masayuki, Shiba, Kim or Akins disclose or suggest a method of manufacturing a display device, having at least steps of forming features of which repellency to an optical material liquid or a liquid precursor of the optical material is different from that of peripheries of the features so that the features define predetermined positions at a surface of an object including a display substrate, and applying the optical material liquid or the liquid precursor to the surface of the object having features, as recited in independent claim 7.

Finally, neither Yuichi, Masayuki, Shiba, Kim or Akins disclose or suggest a method of manufacturing a display device, having at least steps of disposing an optical material or a precursor of the optical material at predetermined positions defined by features formed on an object including a display substrate, forming a layer to be transferred, including a plurality of scanning lines and signal lines, pixel electrodes and switching elements, for controlling the pixel electrodes, on a peeling layer formed on a peeling substrate, and transferring the layer onto the object coated by the optical material or the precursor, as recited in independent claim 8.

Specifically, Yuichi discloses a polymer distributed liquid crystal display device having a partition wall 6 composed of water repellent resonant formed at a gap between the areas of the liquid crystal/polymer composite film 5.

Masayuki discloses a liquid crystal optical element having a transparent conductive film 2 formed on the surface of a transparent substrate 1. Furthermore, hydrophilic parts 3 and water repellent parts 4 are formed on the transparent conductive film 2.

Shiba discloses, in Fig. 1a, that portions of the resin layer which are shaded by black matrices 2 are first pattern-exposed through a photo-mask 4 to cure these portions of the resin layers, thereby forming sites 8 (non-colored portions) which do not absorb ink. See generally Figs. 1a-1f and col. 6, lines 44-51. Then the same layers colored in colors R, G and B by the use of an ink jet head 5, and the ink is dried. Shiba further discloses that the forming sites 8 are converted from resin layer 3 by light-irradiation.

Kim and Akins disclose a liquid crystal display with liquid crystal material as the optical material between features.

In contrast to Applicants' claimed invention, Yuichi, Masayuki, Shiba, Kim or Akins, alone or in combination, all fail to disclose or suggest features of which repellency to the optical material in a liquid or a liquid precursor of the optical material is substantially different from that of peripheries of the features, there not being a starting material for forming the features at the predetermined positions. In fact, the material arranged at positions defined by the forming sites 8 in Shiba is a starting material for the forming sites 8. Furthermore, Shiba fails to disclose that a difference in height between the features and predetermined positions defined by the features is formed.

Yichi, Masayuki and Kim and Akins fail to disclose that the display device has switching elements, and disposing an optical material by an ink jet method.

Accordingly, because Yichi, Masayuki and Kim and Akins fail to disclose these features, patterning precision can deteriorate due to the fluidity of the solution of the optical material. Furthermore, because the cited references do not disclose these features, they do not disclose a manufacturing method that is efficient in producing a matrix type display device in which a liquid optical material can be securely arranged at predetermined positions while maintaining characteristics such as low cost, high throughput and a high degree of freedom of the optical material.

Accordingly, Applicants assert that claims 1-19, 32, 50-51 and 53-65 define patentable subject matter. Thus, Applicants respectfully request that the rejections under 35 U.S.C. §102(b) and 35 U.S.C. §103(a) be withdrawn as applied to claims 1-19, 32, 50-51 and 53-65.

In view of the foregoing, Applicants submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-19, 32, 50, 51 and 53-65 are earnestly solicited.

Should the Examiner believe that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' attorney at the telephone number listed below.

Respectfully submitted,

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Attachment:
Appendix

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**DEPOSIT ACCOUNT USE
AUTHORIZATION**
Please grant any extension
necessary for entry;
Charge any fee due to our
Deposit Account No. 15-0461

APPENDIX

Changes to Claims:

Claims 53-65 are added.

The following is a marked-up version of the amended claims 1-14 and 50-51:

1. (Three Times Amended) A display device comprising:

switching elements; and

an optical material arranged at predetermined positions by features on an object comprising a display substrate, the predetermined positions being defined by features of which repellency to the optical material in one of a liquid or a liquid precursor of the optical material is being substantially different from that of peripheries of the features, there not being a starting material for forming the features at the predetermined positions.

2. (Three Times Amended) A method of manufacturing a display device, the method comprising the steps of:

forming features of which repellency to an optical material in one of a liquid or a liquid precursor of the optical material is substantially different from that of peripheries of the features so that the features define predetermined positions at a surface of on an object comprising a display substrate so that a difference in height between the features and predetermined positions defined by the features is formed; and

applying the optical material or the liquid precursor to the surface where the features are formed by an ink jet method.

3. (Three Times Amended) The method of manufacturing a display device according to Claim 2, wherein the features being recesses that are less repellent to the optical material in liquid or the liquid precursor, compared to the peripheries of the recesses; and

the optical material is being disposed at the predetermined positions, by a process including application of the optical material or the liquid precursor to the surface having recesses, with the surface facing upward.

4. (Three Times Amended) The method of manufacturing a display device according to Claim 2, wherein the features being formed in such a manner being are projections that are less repellent to the optical material in liquid or the liquid precursor, compared to the peripheries of the projections; and

the optical material being disposed at the predetermined positions, by a process including application of the optical material or the liquid precursor to the surface having projections, with the surface facing downward.

5. (Three Times Amended) A method of manufacturing a display, the method comprising the steps of:

forming a plurality of first bus lines ~~on a first object comprising a display substrate;~~

forming a plurality of second bus lines;

forming features of which repellency to an optical material in ~~one~~ ~~of~~ a liquid or a liquid precursor of the optical material is different from that of the peripheries of the features so that the features define predetermined positions and a difference in height between the features and the predetermined positions defined by the features is formed at a surface of a second object including the first object;

applying the optical material or the liquid precursor to the surface ~~of the second object having where the features are formed;~~ and

~~forming a plurality of second bus lines over the second object coated by the optical material or the liquid precursor.~~

6. (Three Times Amended) A method of manufacturing a display device according to claim 5, the method further comprising the steps of:

_____ forming a plurality of first bus lines on a first object comprising a display substrate;

_____ forming features defining predetermined positions at a surface of a second object including the first object;

_____ applying one of an optical material or a precursor of the optical material to the surface of the second object;

forming a layer to be transferred, including a plurality of second bus lines, on a peeling layer; and

transferring the layer to be transferred onto the surface ~~second object~~ coated by the optical material or the precursor.

7. (Three Times Amended) A method of manufacturing a display device, the method comprising the steps of:

forming wiring including a plurality of scanning lines and signal lines;

forming features of which repellancy to an optical material ~~in one of a liquid or~~ a liquid precursor of the optical material is different from that of peripheries of the features so that the features define predetermined positions at a surface of an object including a display substrate; and

applying the optical material liquid or the liquid precursor to the surface of the object having features.

8. (Three Times Amended) A method of manufacturing a display device, the method comprising the steps of:

disposing one of an optical material or a precursor of the optical material at predetermined positions defined by features formed on an object including a display substrate;

forming a layer to be transferred, including a plurality of scanning lines and signal lines, pixel electrodes and switching elements, for controlling states of the pixel electrodes, on a peeling layer formed on a peeling substrate; and

transferring the layer to be transferred onto the object coated by the optical material or the precursor .

9. (Three Times Amended) The method of manufacturing a display device according to Claim 2-5, wherein the features comprising at least one of the comprise bus lines.

10. (Three Times Amended) The method of manufacturing a display device according to Claim 2, wherein the features comprising comprise wiring including a plurality of scanning lines or signal lines.

11. (Three Times Amended) The method of manufacturing a display device according to Claim 2, wherein the features comprise comprising pixel electrodes.

12. (Three Times Amended) The method of manufacturing a display device according to Claim 2, wherein the features comprise comprising an interlayer insulation film.

13. (Three Times Amended) The method of manufacturing a display device according to Claim 2, wherein the features comprise comprising a light shielding layer.

14. (Three Times Amended) The method of manufacturing a display device according to claim 2, wherein, in the step of forming features, the features being are formed by application of a material in liquid followed by removal of the material.

50. (Amended) A display device comprising:
switching elements;

an optical material arranged at predetermined positions on an object comprising a display substrate, scanning lines and signal lines; the predetermined positions being defined by features of which repellency to a solution of the optical material or a precursor of the optical material is substantially different from that of peripheries of the features, there not being a starting material for forming the features of the predetermined positions.

51. (Amended) The display device according to claim 50, wherein the repellency of the features to the solution of the optical material or the precursor is lower than that of the predetermined positions being lower in height one between the features and the peripheries of the features.